



B-Line

Shortest Way to Heating Efficiency

**GAS
BOILERS**

Hot Water
Vapor
Steam

B-Line Boiler Co.

Cleveland, Ohio

Catalogue No. 604

◆

B-LINE BOILER CO.

CLEVELAND, OHIO

For B-Line Gas-fired Water Heaters, see Manufacturers' Index

TABLE OF CONTENTS

	Page		Page
Why Gas for Heating.....	1	Models "K" and "DK" Boilers.....	6
Boiler Ratings and Selection Factors.....	3	Principal Dimensions of B-Line Boilers.....	7
Standard Equipment on B-Line Boilers.....	4	B-Line Gas Controls.....	9
Snap Action Valve & Thermostatic Pilot System.....	4	Sample Specifications for B-Line Boilers.....	10
Model "M" Boilers.....	5		

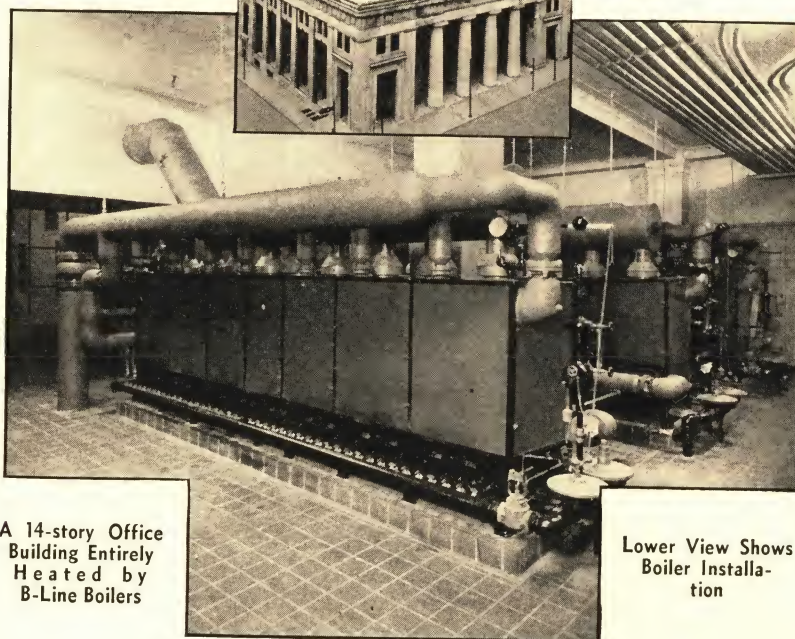
WHY GAS FOR HEATING

Each year witnesses a tremendous increase in all sections of the country in the use of gas for heating. The tremendous growth of the gas distribution systems gives an idea of the rapidly increasing popularity of gas as a fuel, a popularity which is fully deserved in the light of its many advantages—advantages which make gas ideal as a modern fuel.

Advantages of Gas Heating

What are the advantages of gas heating, and who are the beneficiaries of these advantages? First of all the use of a gas boiler simplifies the design of any building. Basement space ordinarily devoted (with solid or liquid fuels) to

the storage of fuels or waste matter left from burning these fuels, may be used for other purposes. In residences, the absolute cleanliness of gas boiler heating allows the basement quarters to be used for laundry and recreation purposes without special precautions for separating the boiler room. With larger buildings, advantageous use can always be made of the space liberated from fuel storage. While these points indicate the advantages of gas boiler heating from the standpoint of building design, the tenants of the building undoubtedly benefit most from the use of gas boiler equipment, because it is in actual use that such heating equipment shows at its best.



A 14-story Office Building Entirely Heated by B-Line Boilers

Lower View Shows Boiler Installation

Importance of Automatic Control

Perhaps the greatest advantage of gas heating is that of fully automatic control. Constant furnace tending becomes a nuisance, and negligence sooner or later becomes inevitable, with the result that fires are not kept at proper level, room temperatures drop, and the rooms become chill. At the other extreme, firing is too rapid and the rooms become greatly overheated. Automatic control, as used on B-Line boilers, removes from human hands the responsibility of constant attendance on the furnace, and places it in instruments which constantly and reliably maintain temperatures at the proper point. For commercial buildings this means lack of complaints from tenants; to the home owner it means a vacation from petty cares, and comfort without worry.

B-Line gas boilers are provided with automatic con-



fuel, because gas is not paid for until it has been used. Constant fuel quality is assured because it is insured by governmental agencies. High efficiency is also obtained with B-Line gas boilers because the elimination of the uncertainties of hand firing and the manufacture of the complete equipment permit a design which will utilize to a maximum the heat which the gas contains.

Commercial Heating

While the heating of buildings with gas presents a tremendous num-

ber of advantages, it is not the only field for gas boilers. An increasing number of commercial and industrial organizations are turning to B-Line boilers because of their ease of control, flexibility, speed, and lack of supervision required for many uses, such as large volume of hot water supply, plating baths, swimming pools, sprinkler tanks, drying kilns, and other work requiring low pressure steam or hot water.

An Ideal Fuel

Gas is without doubt ideal as a fuel—it satisfies every requirement of ease of control, cleanliness, easy handling, high efficiency, and constant quality, but its most satisfactory use depends upon the equipment in which it is burned. This makes the choice of gas heating equipment of paramount importance to the architect, engineer, and building owner.

In the following pages we present a series of B-Line gas boilers which are the result of many years' experience in the development of gas heating equipment. They offer important advantages in ease of operation, heating efficiency, and fuel economy. The B-Line boiler sections, efficiently designed burners, an effective system of automatic air regulation, thorough insulation and dependable control systems make possible with B-Line gas boilers a guarantee of exceptionally satisfactory heating service.



trols which not only regulate the temperature to the desired point, but also keep watch over the temperature of water in the radiators, the pressure of steam, and level of water in the boilers. Thermostatic pilots are provided to insure the turning off of gas whenever the automatic ignition pilots are turned off, and to prevent turning on the gas before the pilots are lighted. Gas pressure is kept at the proper point for maximum efficiency of operation regardless of variation which may occur in the gas mains. With all of these automatic features, a B-Line boiler installation will heat any building with practically no attention—in short, it brings to heating the service which the telephone, electric light, mechanical refrigerator, and radio have given in other directions.

Uniform Heating

The advantages of gas heating are not confined to the mere saving of time and labor. Gas heating makes the maintenance of uniform temperatures in home or office an easy matter, and thus does much to offset the unhealthy conditions to which we are accustomed in the winter. It eliminates the advance investment in



From Cottages to Skyscrapers There Are B-Lines to Fit

RATINGS AND BOILER SELECTION FACTORS

Boiler Ratings

Gas boilers for space heating are most commonly rated according to their output in terms of direct cast iron radiation. B-Line boilers are rated in accordance with the test procedure of the American Gas Association Testing Laboratory, in which the actual hourly Btu output is divided by 240 for square feet of steam rating, and by 150 for square feet of water rating, these figures being taken as the average heat emission for direct cast iron radiation.

Selecting the Boiler Size

In determining the proper size of boiler it is necessary to make an allowance for piping losses and for heating the system quickly from a cold start. The proper allowance is variable, depending upon the size and layout of the system, and can be most correctly made by the engineer supervising the installation of the boiler. For convenience the selection factors recommended for gas boilers by the American Gas Association, and recognized as correct for the average system,

have been applied to obtain the direct cast iron radiation loads listed below.

Indirect Radiation and Unit Heaters

Before determining the size of boiler with indirect radiation or unit heater systems the load should be reduced to the equivalent direct cast iron radiation or listed in Btu per hour from manufacturer's tables. With these systems the average selection factors can be discarded as each system must be figured separately. Piping loads for unit heater systems seldom exceed 20 per cent, while central blast systems have very little piping load and a starting load depending upon the proportion of outside and recirculated air. Where steam pressure is maintained constantly on unit heaters, the temperature control being centered in the fans, no starting allowance need be made.

Boiler Horsepower

For industrial uses the hourly Btu output divided by 33,500 is listed as Boiler Horsepower.

B-LINE BOILER RATINGS

Boiler No.	Btu output per hour	Boiler Hp.	A. G. A. Rating		Radiation Load	
			Steam	Water	Steam	Water
Model "M" Boilers						
22	38,400	1.1	160	260	105	165
23	76,800	2.3	320	510	210	325
24	115,200	3.4	480	770	310	495
25	153,600	4.6	640	1020	415	655
26	192,000	5.7	800	1280	520	820
27	230,400	6.9	960	1540	630	1010

Models "K" and "DK" Boilers

43	158,400	4.7	660	1060	425	680
54	211,200	6.3	880	1410	575	920
65	264,000	7.9	1100	1760	730	1170
76	316,800	9.5	1320	2110	885	1420
87	369,600	11.0	1540	2460	1040	1665
98	422,400	12.6	1760	2820	1195	1915
109	475,200	14.2	1980	3170	1350	2160
1110	528,000	15.8	2200	3520	1505	2410
1211	580,800	17.3	2420	3870	1660	2660
1312	633,600	18.9	2640	4220	1815	2905
1413	686,400	20.5	2860	4580	1970	3155
1514	739,200	22.1	3080	4930	2130	3410
1615	792,000	23.6	3300	5280	2295	3675
1716	844,800	25.2	3520	5630	2455	3930
1918	950,400	28.4	3960	6340	2780	4450
2019	1,003,200	30.0	4180	6690	2950	4720
2120	1,056,000	31.5	4400	7040	3110	4980
2322	1,161,600	34.7	4840	7740	3440	5505
2524	1,267,200	37.8	5280	8450	3770	6035
2726	1,372,800	41.0	5720	9150	4090	6545
2928	1,478,400	44.1	6160	9860	4400	7040
3130	1,584,000	47.3	6600	10560	4710	7540
3332	1,689,600	50.4	7040	11260	5030	8050
3534	1,795,200	53.6	7480	11970	5340	8545
3736	1,900,800	56.7	7920	12670	5660	9060
3938	2,006,400	59.9	8360	13380	5970	9555
4140	2,112,000	63.0	8800	14080	6290	10065

STANDARD EQUIPMENT ON B-LINE BOILERS

A wide variety of controls may be furnished with B-Line boilers, according to their application. The standard controls and trimmings for the various types of boilers are listed below.

Type "S"

Gas pressure regulator
Snap action gas control valve
Labeled non-throttling hand control valve
Steam pressure control
Compound retard steam gauge
Pop safety valve, set 15 or 5 lbs. per sq. in.
Water gauge and try cocks
Drain cock
Metal jacketed covering
Draft hoods
Pilots, cock and piping

Type "SA"

Gas pressure regulator
Snap action gas control valve
Labeled non-throttling hand control valve
Combination steam pressure and low water control
Thermostatic pilots, cock and piping
Solenoid valve with hand control gas valve and transformer
Compound retard steam gauge
Pop safety valve, set 15 or 5 lbs. per sq. in.
Water gauge and try cocks
Drain cock
Metal jacketed covering
Draft hoods

Type "W"

Gas pressure regulator
Quick acting lever control valve
Labeled non-throttling hand control valve
Altitude gauge
Thermometer
Drain cock
Metal jacketed covering
Draft hoods
Pilots, cock and piping

Type "WA"

Gas pressure regulator
Snap action gas control valve
Labeled non-throttling hand control valve
Thermostatic pilots, cock and piping
Water temperature thermostat
Solenoid valve with hand control gas valve and transformer
Altitude gauge
Thermometer
Drain cock
Metal jacketed covering
Draft hoods

(For Types "AA" and "SIA" for storage water heating, see our water heating section on page 12.)

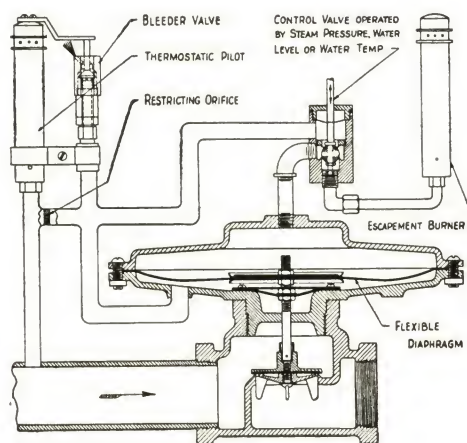
B-Line automatic controls are operated by gas pressure, except Type "W," which is operated manually or by electric motor. Electricity is used only for operating room temperature control. Standard electrical equipment operates only on 60-cycle, 110-volt a-c. current. Equipment for other types of current can be supplied on special order.

SNAP ACTION VALVE AND THERMOSTATIC PILOT SYSTEM

In B-Line boilers equipped with complete automatic controls, the snap action gas control valve operates in the main gas line to turn the gas on or off under the action of the various control units. The valve disc is moved to or from the seat by gas pressure acting on a flexible diaphragm. When there is no gas pressure above the diaphragm, it is lifted by the pressure beneath, carrying the valve disc to the open position. If gas is admitted to the top of the diaphragm, the pressure above and below is equalized and the valve disc is carried by gravity to the closed position. Gas for operating the diaphragm is taken from the supply line and directed to the proper chamber by small control valves operated by steam pressure, water level, water

temperature, or room temperature. These control valves are large enough to change the diaphragm pressures quickly, while the diaphragm travel necessary for full opening or closing of the main valve is very small, so that an essentially snap control of the gas supply results. To insure positive closure of the valve, the disc is faced with soft leather and is guided to its seat by metal guides.

Thermostatic pilots operating on B-Line diaphragm valves cut off the gas by starving the lower diaphragm chamber of gas pressure. This is done by a small bleeder valve, open when the pilot is cold. Bleed gas is discharged directly at ignition pilot, making pilots easily inspected for correct functioning, and readily accessible in case adjustment should be necessary.



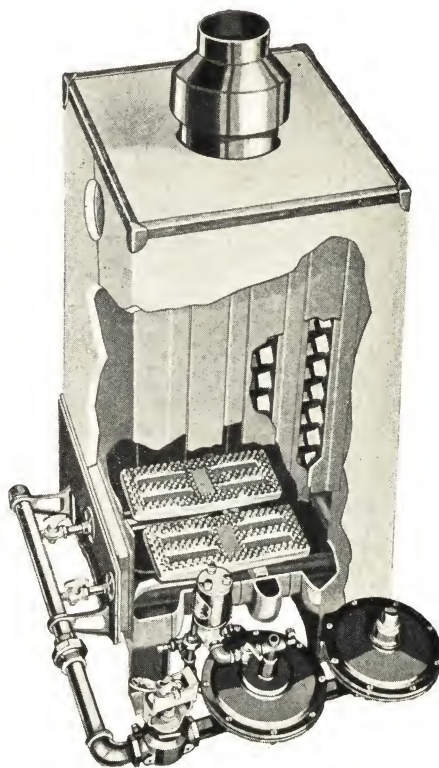
B-LINE MODEL "M" BOILERS

Model "M" B-Line boilers are designed especially for small and moderate sized heating systems and for industrial processes requiring low pressure steam or hot water. Due to the small range of sizes involved they have been designed with constructional features which make their installation exceptionally economical for duplex residences, small apartment houses, office and store blocks, as well as single residences requiring up to 630 sq. ft. of steam radiation or its equivalent in hot water radiation. As hot water supply units the various sizes will be found exceedingly well adapted to the small and medium size apartment buildings, office buildings, dormitories, or similar applications where relatively large volumes of hot water are required.

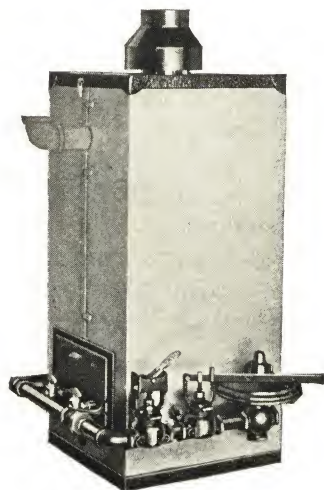
The general construction of Model "M" boilers is shown in the accompanying illustration. High efficiency is secured by the diamond shaped projections extending outward from the sides of adjacent sections in a staggered relationship, insuring complete scrubbing of heat from

the combustion gases by a two-plane flue gas travel. These projections are hollow, making all of the heating surface direct and water-backed, resulting in a continued rapid action and maintained efficiency. Water tubes extend downward from the heating surfaces, enclosing both sides and bottom of the combustion chamber, and preventing heat loss to the floor and atmosphere. At the top of the sections the flue gases are collected in a cast iron hood which prevents corrosive action of flue gases on the jacket top. The boiler is fitted with an insulated metal jacket, attractively enameled.

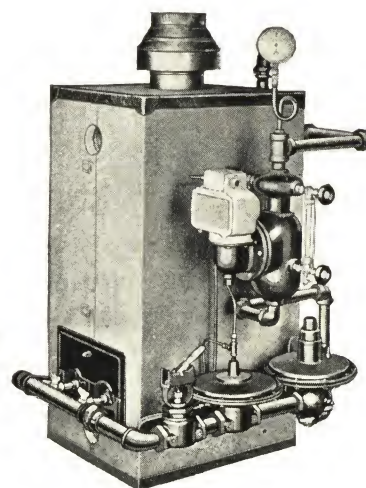
An important feature of these boilers is the ease of erection on the job. The sections are shipped assembled, as well as the complete gas regulation system. Gas manifold, pilot and escapement burners are assembled to the door frame which is attached to the sections as a unit. An exclusive three piece jacket is used, which is attached to the boiler by spring clips, no bolts or screws being required.



Phantom View of Model "M" Boiler



At Left:
Model "M" Water Boiler



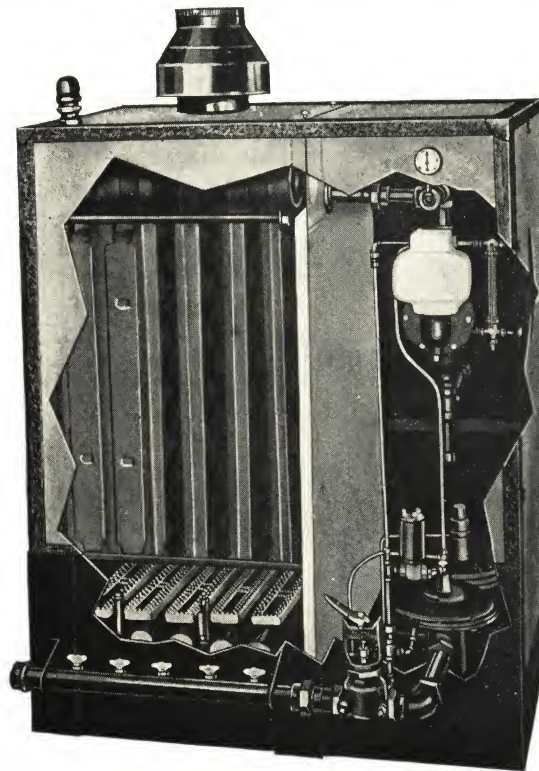
At Right:
Model "M" Steam Boiler

B-LINE MODELS "K" AND "DK" BOILERS

Models "K" and "DK" B-Line boilers are available for heating systems ranging from the average seven-room residence to the largest commercial and industrial applications. The size of the section, volume of water content, and steaming space above the water line make them especially well adapted to industrial applications of low pressure steam, as well as for large volume water heating and space heating.

In these boilers an unusually large cast iron section is used. Its water passages form a construction which provides an inclined upward circulation of heated water and rapid release of steam as it is formed at any point in the section. At the same time the convolutions of adjacent sectional surfaces present a staggered flue passage to insure long effective flue gas travel and produce a high thermal efficiency, an effect which is heightened by the all direct and water-backed heating surface. The flue spaces between the sections are closed by cast iron cleanout panels, easily removable for inspection and cleaning of the heating surfaces, and are closed at the top by a cast iron hood or flue gas collector which is connected to the chimney through a draft hood for the nullification of adverse chimney drafts.

The sections are mounted on a strong cast iron base, providing maximum ease of assembly and reducing the labor involved in case of repairs. Burners and pilots are assembled in the base which forms the bot-



Phantom View of Model "DK" Boiler

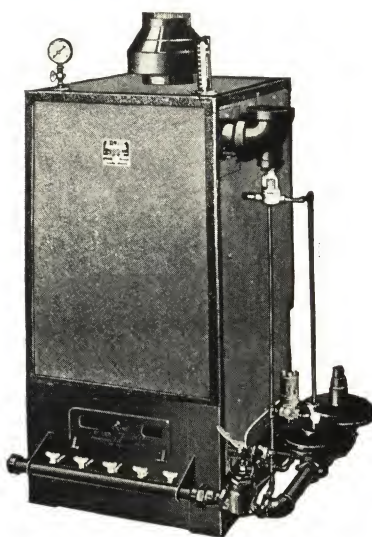
tom and sides of the combustion chamber. All gas controls are assembled before shipment and are connected on the job by unions, thus further facilitating the erection of the boiler.

Jackets are of insulated metal attractively finished in enduring enamels. They are assembled on the boiler by spring clips, without the use of tools.

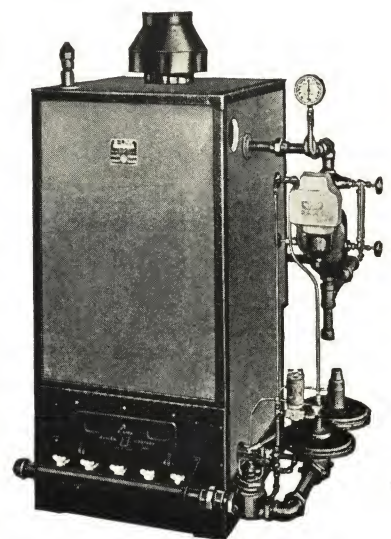
An exclusive feature of Models "K" and "DK" B-Lines is the air control. This consists of an air damper, automatically operated by gas pressure, which closes whenever the gas is turned off. Since all of the air for combustion is taken from the firebox, the closing of the door completely stops the flow of air through the boiler when the gas is cut off and eliminates the loss of heat which would occur if air were passing over the heated sections to the chim-

ney. Automatically controlled gas boilers operate only about one-fourth of the full time per heating season, and this feature therefore represents a material saving in fuel bills.

Models "K" and "DK" are similar in all points of design which affect efficiency and economy of operation. In Model "DK" extra jacket panels are provided to cover the gas regulation and controls for use in basement recreation rooms where a separate enclosure for the boiler is not provided. Burner cocks and manual gas cut-off, however, are accessible for quick control of the boiler without removal of doors or jacket panels.

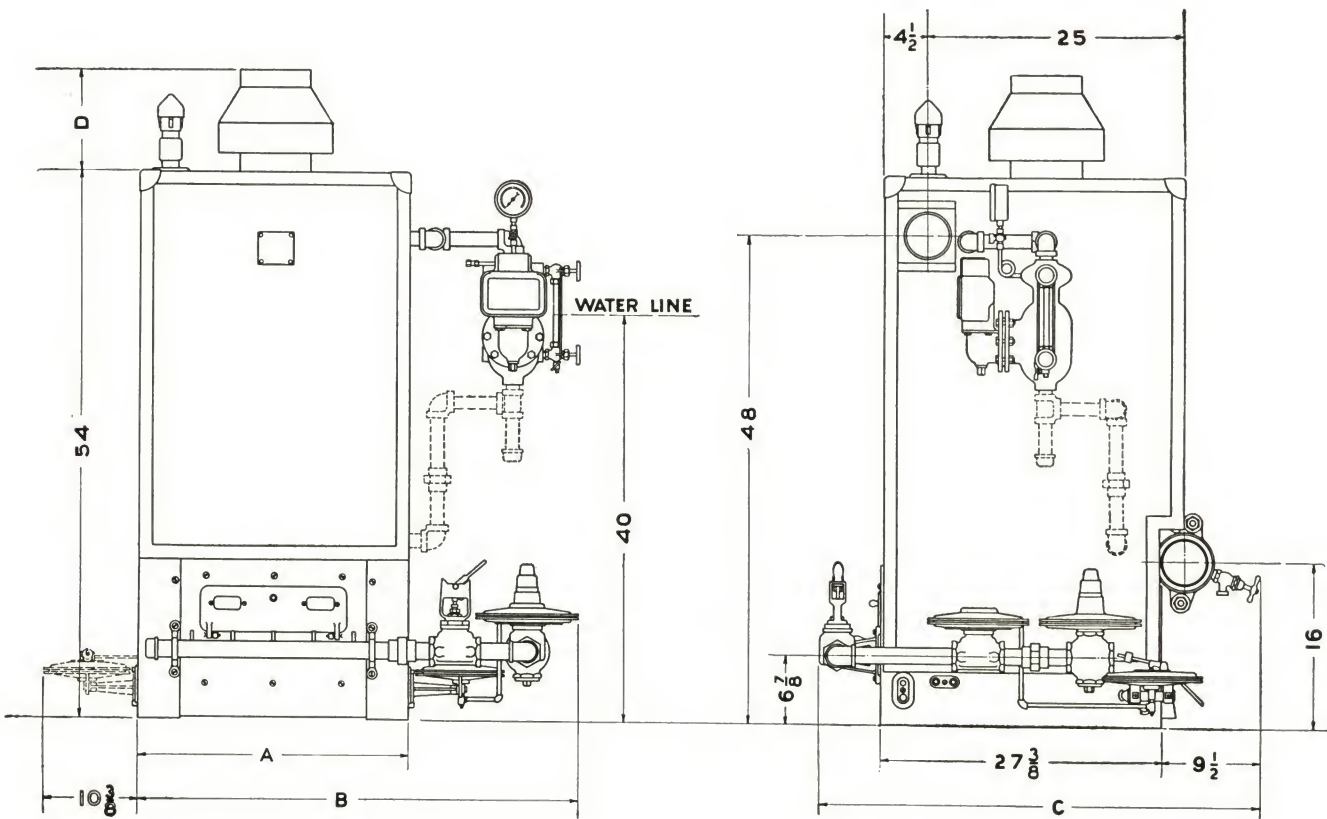


Model "K" Water Boiler

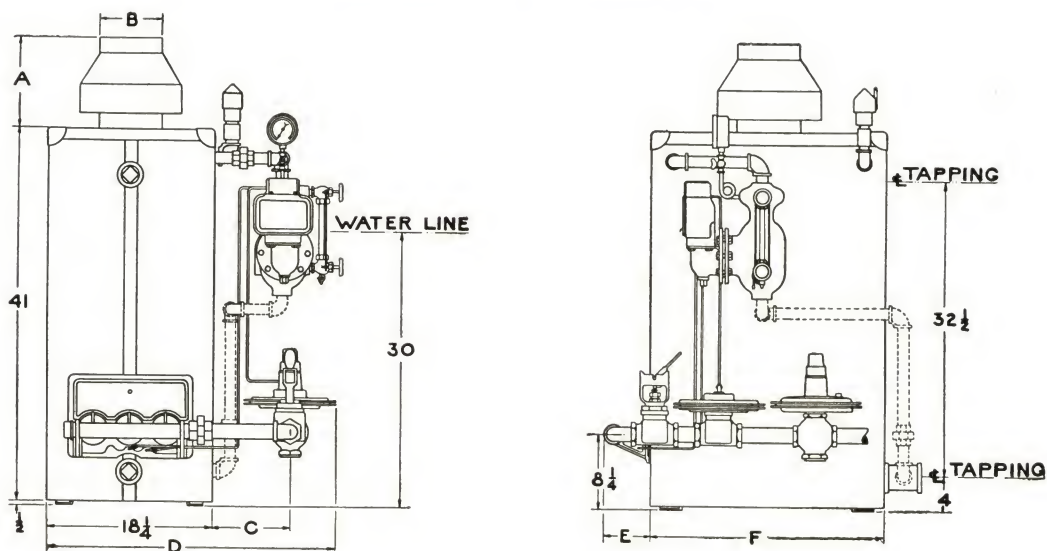


Model "K" Steam Boiler

DIMENSIONAL DIAGRAM MODELS "K" AND "DK" BOILERS



DIMENSIONAL DIAGRAM MODEL "M" BOILER



PRINCIPAL DIMENSIONS OF MODELS "K" AND "DK" BOILERS

All Dimensions in Inches

Boiler No.	Length face to face end tappings	A	B	C	Flanged flow openings		Flanged return openings		Gas regulation I.P.S.	Flue openings		Flue pipe to chimney	Shipping weight, lbs.
					No.	Size	No.	Size		No.	Size		
43	16 $\frac{3}{8}$	18 $\frac{1}{2}$	32	42	.....	.....	.....	.....	1	1	6	6	1260
54	20 $\frac{1}{2}$	22 $\frac{1}{2}$	39	43	.....	.....	.....	.....	1 $\frac{1}{4}$	1	7	7	1510
65	24 $\frac{9}{16}$	26 $\frac{3}{4}$	43	43	.....	.....	.....	.....	1 $\frac{1}{4}$	1	8	8	1758
76	28 $\frac{5}{8}$	30 $\frac{3}{4}$	47	43	.....	.....	.....	.....	1 $\frac{1}{2}$	2	6	8	1978
87	32 $\frac{3}{4}$	35	51	43	.....	.....	.....	.....	1 $\frac{1}{2}$	2	7	10	2268
98	36 $\frac{13}{16}$	39	56	44	.....	.....	.....	.....	2	2	7	10	2549
109	40 $\frac{15}{16}$	43	61	44	.....	.....	.....	.....	2	2	8	12	2792
1110	45	47 $\frac{1}{4}$	65	44	.....	.....	.....	.....	2	2	8	12	3068
1211	49 $\frac{1}{8}$	51 $\frac{3}{4}$	69	44	.....	.....	.....	.....	2	3	7	12	3340
1312	53 $\frac{5}{16}$	55 $\frac{1}{2}$	73	44	1	3	1	3	2	3	7	12	3690
1413	57 $\frac{5}{16}$	59 $\frac{1}{2}$	77	44	1	3	1	3	2	3	8	14	3935
1514	61 $\frac{3}{8}$	63 $\frac{1}{2}$	81	44	2	3	2	3	2	3	8	14	4267
1615	65 $\frac{1}{2}$	67 $\frac{3}{4}$	85	44	2	3	2	3	2	4	7	14	4543
1716	69 $\frac{5}{8}$	71 $\frac{3}{4}$	90	44	2	3	2	3	2	4	7	14	4775
1918	77 $\frac{3}{4}$	80	98	44	2	3	2	3	2	4	8	14	5344
2019	81 $\frac{7}{8}$	84	102	44	3	3	3	3	2 $\frac{1}{2}$	4	8	16	5510
2120	86	88 $\frac{1}{4}$	106	44	3	3	3	3	2 $\frac{1}{2}$	5	7	16	5910
2322	94 $\frac{3}{16}$	96 $\frac{3}{4}$	115	45	3	3	3	3	3	5	8	16	6400
2524	102 $\frac{5}{16}$	104 $\frac{1}{2}$	123	45	3	3	3	3	3	5	8	16	6941
2726	110 $\frac{1}{2}$	112 $\frac{3}{4}$	131	45	3	3	3	3	3	6	8	18	7784
2928	118 $\frac{5}{8}$	120 $\frac{3}{4}$	139	45	3	3	3	3	3	6	8	18	8146
3130	126 $\frac{7}{8}$	129 $\frac{3}{4}$	147	45	4	3	4	3	3	6	8	18	8715
3332	135 $\frac{1}{16}$	137 $\frac{1}{4}$	156	45	4	3	4	3	3	7	8	18	9261
3534	143 $\frac{1}{4}$	145 $\frac{1}{2}$	164	45	4	3	4	3	3	7	8	20	9703
3736	151 $\frac{7}{16}$	153 $\frac{1}{2}$	189	44	5	3	5	3	2-2	8	8	20	10373
3938	159 $\frac{5}{8}$	161 $\frac{3}{4}$	197	44	5	3	5	3	2-2 $\frac{1}{2}$	8	8	20	10680
4140	167 $\frac{7}{8}$	170	205	44	5	3	5	3	2-2 $\frac{1}{2}$	8	8	20	11387

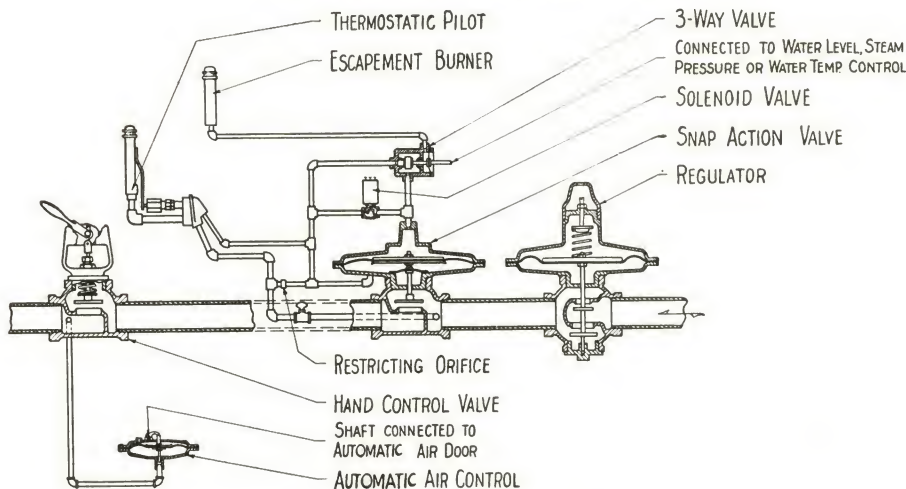
- (1) End sections tapped 4 in. flow and return.
- (2) Flanged return connection on intermediate section furnished only on water boilers.
- (3) Dual gas lines to boilers 3736 and larger.
- (4) Left-hand gas regulation can be furnished.
- (5) Two automatic air valves on all boilers larger than 1716.

PRINCIPAL DIMENSIONS OF MODEL "M" BOILERS

All Dimensions in Inches

Boiler No.	Length face to face end tappings	A	B	C	D	E	F	Gas regulation I.P.S.	Flue pipe to chimney	Shipping weight, lbs.
22	9 $\frac{3}{8}$	7	4	7 $\frac{1}{2}$	30 $\frac{1}{2}$	4 $\frac{3}{4}$	10 $\frac{3}{4}$	1	4	400
23	13 $\frac{1}{16}$	7	5	7 $\frac{1}{2}$	30 $\frac{1}{2}$	4 $\frac{3}{4}$	14 $\frac{1}{2}$	1	5	500
24	16 $\frac{3}{4}$	8	6	7 $\frac{1}{2}$	30 $\frac{1}{2}$	4 $\frac{3}{4}$	18	1	6	630
25	20 $\frac{7}{16}$	10	7	7 $\frac{1}{2}$	33	5	22	1 $\frac{1}{4}$	7	770
26	24 $\frac{1}{8}$	11	8	10	33	5	25 $\frac{1}{2}$	1 $\frac{1}{4}$	8	920
27	27 $\frac{13}{16}$	11	8	10	33	5	29	1 $\frac{1}{4}$	8	1050

B-LINE GAS CONTROLS



General Diagram of B-Line Control System

A fully automatic B-Line control system is shown in the drawing, automatic air control valve as used on Models "K" and "DK" being included. The snap action gas valve and thermostatic pilot system are described on page 4.

Gas Pressure Regulator

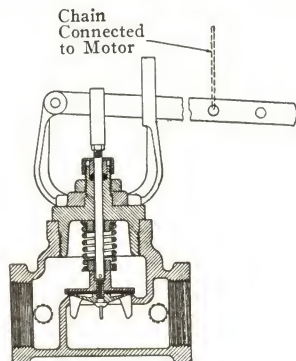
The regulator is a double balanced seat type, the balanced seats giving accurate regulation regardless of variations of the inlet pressure. Large valve openings permit flow of gas up to the full capacity of the pipe. Soft seats are used to insure good regulation when the flow is reduced to a very low point. Pressure adjustment is made by removing the screwed cap at the top and turning the adjustment screw.

Hand Control Valve

An exclusive feature of B-Line hand control valves is the non-throttling device. The valve is closed by a spring against the action of a toggle, and is thrown from fully open to fully closed position by a quick movement of the labeled lever, making it impossible to leave a small amount of gas flowing. A soft guided seat is used to insure positive closure of the valve.

Lever Cut-off Valve

For remote manual or motor control directly on the main gas line, the B-Line quick acting lever valve is



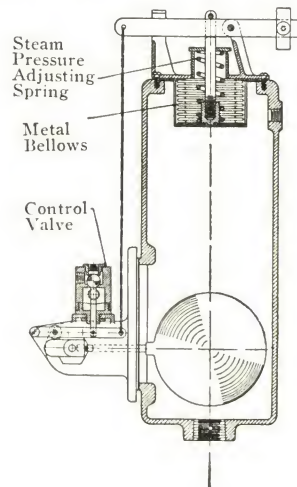
At Left:
Lever Cut-off Valve

readily adaptable. It is closed by a spring using a soft seat for tightness. A by-pass for low flame can be provided. Thermostatic pilots of the electrically operated type may be used when this valve is operated by a motor.

Steam Pressure and Low Water Control

For control by steam pressure or low water a small secondary valve is connected to the snap valve in the main gas line. An increase in steam pressure above the desired amount expands a metal bellows, and the movement of the bellows carries the small control valve to a position which cuts off the gas. When the steam pressure drops the control valve is returned to the open position. The steam pressure cut-off may be set at any desired point, from a few ounces to 15 lbs. per sq. in.

If the water level in the boiler becomes too low the float drops and through a cam moves the control valve to the closed position. When the water is returned to the proper level the control valve automatically returns to the open position. Steam pressure and low water actions are independent, and the setting of one does not affect the sensitivity of the other.



At Right:
Steam Pressure and
Low Water Control

SPECIFICATIONS FOR B-LINE BOILERS

Boiler

Boiler shall be furnished and set in basement, in accordance with instructions furnished by manufacturer, No. B-Line Gas Boiler, as manufactured by the B-LINE BOILER Co. with Type equipment including (copy from page 4), having a rated capacity of square feet.

Gas Connection

Gas supply line shall be inch (see page 8). Use standard make inch valve in vertical drop to gas pressure regulator.

Water Connection

Furnish and install water connection to boiler from building supply and install cock close to boiler.

Flue Pipe

Boiler to be connected to chimney with heavy galvanized iron flue pipe, of full size (see page 8), as required by outlet on boiler.

Supply and Return Mains

Install supply and return mains, of sizes as indicated on plans. To be installed in such a manner as to circulate freely. All supply and return mains to be supported by neat adjustable hangers, arranged to suit expansion and contraction of piping. All piping shall be best grade (iron or steel), with cast iron fittings.

Risers

Install all supply and return risers, of sizes shown, and at locations indicated on plans.

Radiators

Furnish and install radiators, of the type, of heights and capacities as shown on the plans.

Radiator Valves

Each radiator to be equipped with a nickelplated quick opening union radiator valve; also a nickel No. air valve.

Floor and Ceiling Plates

At all points where pipes pass through ceilings or floors, the openings to be protected with nickelplated plates, properly secured in place.

Guarantee

The contractor must guarantee to heat all rooms in which radiators are placed to degrees Fahrenheit, with degrees temperature outside.

Painting

All radiators and exposed pipe work above basement to be bronzed or painted in colors as directed.

B-LINE
OILER CO.
